

Amendments to the Claims

This listing of claims will replace all prior listings of claims in the application.

Listing of Claims

1.-22. (Canceled)

23. (New) A butt welding apparatus for butt welding end faces of at least one plate member by electric resistance heating, comprising:

means for supporting the at least one plate member such that the end faces abut each other and form a butt portion;

a pair of electrode members disposed opposite to one another for performing electric resistance heat welding of the butt portion, said pair of electrode members comprising a first electrode member provided at a first side of the butt portion and a second electrode member provided at a second side of the butt portion opposite to the first side, said first electrode member being positioned so that it extends across the butt portion and having an outer surface with a first convex portion which faces the at least one plate member and gradually retreats therefrom as it extends from an intermediate portion of the first electrode member outer surface and the second electrode member being positioned such that it extends across the butt portion; and

means for causing relative movement of the first and second electrode members toward each other and contacting of a surface of the at least one plate member with the first electrode member and cause an end face thereof to deform toward the other end face, melt and join with the other end face.

24. (New) The butt welding apparatus of Claim 23, wherein the first electrode member additionally comprises a

second convex portion connected to the first convex portion at the intermediate portion of the first electrode, the second convex portion gradually retreating from the at least one plate member as it extends away from the intermediate portion.

25. (New) The butt welding apparatus of Claim 23, wherein the first electrode member additionally comprises a flat portion connected to the first convex portion at the intermediate portion of the first electrode member, the flat portion and the intermediate portion of the first electrode member being contained in a plane which is approximately parallel to the at least one plate member.

26. (New) The butt welding apparatus of Claim 23, wherein the second electrode member has an outer surface with a flat portion which faces and is approximately parallel to the at least one plate member.

27. (New) The butt welding apparatus of Claim 23, wherein the second electrode member has an outer surface with a first convex portion which faces the at least one plate member and gradually retreats therefrom as it extends from an intermediate portion of the second electrode member outer face and a second convex portion connected to the first convex portion at the intermediate portion of the second electrode member, the second convex portion gradually retreating from the at least one plate member as it extends away from the intermediate portion of the second electrode member.

28. (New) The butt welding apparatus of Claim 23, wherein the second electrode member has an outer surface with a first convex portion which faces the at least one plate member and gradually retreats therefrom as it extends from an intermediate portion of the second electrode member outer face and a flat portion connected to the first convex portion at the intermediate portion of the second electrode member, the

flat portion and the intermediate portion of the second electrode member being contained in a plane which is approximately parallel to the at least one plate member.

29. (New) The butt welding apparatus of Claim 23, wherein the pair of electrode members are electrode rollers which roll relative to the at least one plate member.

30. (New) The butt welding apparatus of Claim 23, wherein the pair of electrode members are block electrodes which extend along the length of the butt portion and are means for applying a press load on the at least one plate member.

31. (New) The butt welding apparatus of Claim 30, wherein the butt portion extends linearly and the block electrodes have linearly extending shapes corresponding to the butt portion.

32. (New) The butt welding apparatus of Claim 30, wherein the butt portion extends non-linearly and the block electrodes have non-linearly extending shapes corresponding to the butt portion.

33. (New) The butt welding apparatus of Claim 30, wherein the block electrodes have shapes corresponding to the shape of the at least one plate member.

34. (New) The butt welding apparatus of Claim 30, wherein the block electrodes are arranged in respective press dies for press-forming the at least one plate member.

35. (New) The butt welding apparatus of Claim 34, wherein the block electrodes are assembled in the respective press dies via electrically insulating members.

36. (New) The butt welding apparatus of Claim 23, wherein the electrode members are spot electrodes for spot-welding the at least one plate member.

37. (New) The butt welding apparatus of Claim 36, wherein the spot electrodes are for butt-welding a press-formed at least one plate member.

38. (New) The butt welding apparatus of Claim 36, wherein the spot electrodes are arranged in respective press dies for press-forming the at least one plate member.

39. (New) The butt welding apparatus of Claim 38, wherein the spot electrodes are assembled in the respective press dies via electrically insulating members.

40. (New) The butt welding apparatus of Claim 23, wherein the at least one plate member comprises two plate members and the butt portion is formed by butting respective end faces of the two plate member to each other.

41. (New) The butt welding apparatus of Claim 23, wherein the at least one plate member comprises one plate member and the butt portion is formed by butting two end faces of the one plate member.

42. (New) The butt welding apparatus of Claim 41, wherein the one plate member is formed by joining a plurality of plate members.

43. (New) A butt welding method for butt welding end faces of at least one plate member by electric resistance heating, comprising the steps of:

supporting the at least one plate member such that the end faces abut each other and form a butt portion;

providing a butt welding apparatus comprising a pair of electrode members disposed opposite to one another for performing electric resistance heat welding of the butt portion, said pair of electrode members comprising a first electrode member provided at a first side of the butt portion and a second electrode member provided at a second side of the butt portion opposite to the first side, the first electrode member having an outer surface with a first convex portion which faces the at least one plate member and gradually retreats therefrom as it extends from an intermediate portion of the first electrode member;

positioning the electrode members such that they extend across the butt portion and the intermediate portion is offset from the joint portion by an amount based on the thicknesses of the end faces forming the joint portion in the direction of the first convex portion; and

pressing a surface of the at least one plate member with the first electrode member while performing electric resistance heating of the at least one plate member to cause an end face thereof to deform towards the other end face, melt and join with the other end face.

44. (New) The butt welding method of Claim 43, wherein the pair of electrode members are arranged in respective press dies for press-forming the at least one plate member.